The proposed South Star 115 kilovolt (kV) transmission line will connect the South Star Cogeneration Project (South Star Project) to the existing Morgan Substation owned by Texaco California Inc. (TCI). An approximate 5.3 mile 115 kV transmission line will be constructed. This construction will involve utilizing the existing alignment of the TCI-owned Feeder #5 power line.

Development of this proposed transmission line project will utilize preliminary engineering prepared by Black & Veatch Pritchard, Inc. (B&V), and ongoing transmission system interconnection studies being prepared by PG&E.

6.1 TRANSMISSION LINE ENGINEERING

6.1.1 Existing Facilities

The identified existing facilities in the area of the South Star Project:

- **TCI's Morgan Substation** is located south of Mocal Road in Section 35, Township 31 South, Range 22 East. This substation is connected to PG&E's 115 kV Midway-Santa Maria transmission line, and includes two 115/12 kV power transformers, and five 12 kV distribution feeders.
- **TCI's Feeder #5** power line originates from the Morgan Substation and continues south-easterly for approximately 4.8 miles. This 12.47 kV line currently provides distribution power to the Midway Sunset Oil Field. The existing line terminates approximately in the southwest ¼ of section 17 near the proposed South Star Site I.

6.1.2 South Star Transmission Line

The proposed South Star 115 kV transmission line will be constructed using the alignment of TCI's Feeder #5 power line. This power line is approximately 4.7 miles in length and currently provides distribution power to the Midway Sunset Oil Field. The electrical loads on Feeder #5 will be transferred to the Morgan Substation.

Using the alignment of Feeder #5 will involve the removal of all existing conductor, insulators and wood poles. New taller and higher capacity wood poles will be installed in the same locations as the old poles. New conductor and insulation required for the

South Star Cogeneration project will be installed. In addition to using new poles and the alignment of Feeder #5, approximately 0.6 miles of new transmission line utilizing wood poles is proposed to connect the previous Feeder #5 to South Star I. The required right of way width for the proposed South Star transmission line is 75 feet.

The completed South Star transmission line will originate at South Star I and continue north westerly utilizing the alignment of the previous Feeder #5. The line leaving South Star I will be single circuit until reaching South Star II. There the line will become double circuit and continue north westerly until terminating at the TCI-owned Morgan Substation. Figures 6-1 and 6-2 show typical single and double circuit tangent structures. The proposed line route will cross over several existing distribution lines. It is not anticipated that any customers would be affected by outages during the line construction.

Figure 8.11-7 is a photo rendering of the proposed transmission line entering the Morgan Substation.

Figures 6-3 is a one-line diagram of the proposed project.

6.1.2.1 Other

Industry typical design, operation, or maintenance practices will be required for the proposed transmission line facility. Transmission structure locations will be accessible from existing dirt, gravel, or paved roads with the addition of short spur roads; the spur roads will not be graded unless necessary. Construction access routes will be flagged in the field as required.

The anticipated schedule for construction of the transmission line is as follows:

- November 2001 Start Transmission Line Construction
- May 2002 Complete Transmission line Construction

6.1.3 Applicable Regulations

The transmission line will generally be designed and constructed in conformance with CPUC GO-95 and the National Electrical Safety Code (NESC). A list of applicable laws, ordinances, regulations, and standards (LORS) that may apply to the transmission line are presented in the following sections.

6.1.3.1 Design and Construction

Table 6-1 lists LORS applicable to the design and construction of the transmission line.

6.1.3.2 Fire Hazard

Table 6-2 lists the LORS, which govern fire hazard protection for the project.

6.1.3.3 Hazardous Shock

Table 6-3 lists the LORS regarding hazardous shock protection for the project.

6.1.3.4 Jurisdiction

Table 6-4 identifies agencies with jurisdiction to issue permits, approvals, and/or enforce laws and regulations.

6.2 TRANSMISSION LINE ELECTRICAL EFFECTS

6.2.1 Project Characteristics

To integrate the South Star Cogeneration Project output into the CDWR/PG&E 115 kV transmission system, the South Star Project intends to construct a 5.3 mile, 115 kV transmission line between the South Star Project and the Morgan Substation. The transmission line will be capable of transmitting the output of 260 MW (net — approximate maximum at minimum ambient temperature).

The following design criteria and assumptions were used to complete the initial design of the project’s double circuit and single circuit transmission line and calculate its electromagnetic field (EMF), audible noise and radio/television interference effects.

6.2.1.1 Assumptions

The nominal transmission voltage will be 115 kV. The calculations were performed at a 5% maximum overvoltage of 121 kV.

The transmission line is approximately 5.3 miles in length.

For these calculations, the transmission line loading will be 260 MW (130 MW per circuit net - approximate maximum at minimum temperature).

The phase currents will be balanced (equal). The power factor used in the calculations will be 0.85 (leading or lagging). Continuous plant operation will not be performed at this power factor and variations to the actual power factor can be expected.

The transmission line electrical phasing arrangement will be the low reactance (ABC-CBA) arrangement. This arrangement reduces electric and magnetic field levels.

For the purposes of these calculations, the EMF, RI, TVI and audible noise calculations were performed at an assumed minimum conductor height above ground of 25 feet (mid-span).

The calculations were performed using the Bonneville Power Administration (BPA) Corona and Field Effects (CFE) Program.

6.2.1.2 Conductor Analysis

The selection of a phase conductor size and type for a new transmission line typically considers a number of different factors. The factors considered generally include the following:

- **Thermal Capacity** - The conductor size/type and bundle configuration selected must have a thermal capacity greater than the initial and future capacity requirements of the project.
- **Economics** - Economic evaluations typically consider the effects on conductor, structure and foundation costs of various conductor sizes/types and bundle configurations (conductor diameters, sags and tensions). The present worth of conductor losses is also typically considered.

- **Environmental** - Electric and magnetic field strengths are largely dependent on the maximum line operating voltage, phase conductor currents and the spatial arrangement (configuration) of the phase conductors, not the conductor size/type and bundle configuration.
- **Standardization** - Industry standard/typical conductor sizes/types and bundle configurations are given preference due to operation and maintenance, and inservice reliability considerations.
- **Minimum Size** - A minimum allowable all aluminum conductor size of 312.8 kcmil was selected for this project. This minimum size selection was based on a combination of radio and television interference, corona, mechanical sag and strength considerations and is applicable to non-bundled phase conductors only.
- **Single Versus Double Circuit Line -** A single circuit line, with bundled (two or three) conductors and a double circuit line with one or two conductor per phase were considered for the proposed line.

Giving consideration to the previously described selection factors, a double circuit line using a single 715.5 kcmil, 37 strand, AAC "Violet" conductor was selected for the proposed line. This conductor size/type has an ampacity of 800 amperes (conductor temperature rise of 40°C over a 40°C ambient air temperature, with a 2 ft/s crosswind and an emissivity of 0.5 without sun).

The maximum anticipated loading on the proposed transmission line, for these calculations, is 306 MVA at an 85% power factor. This loading will result in a maximum current in each phase of 768 amperes.

6.2.2 Aviation Safety

There is only one major aviation center in the general vicinity of the project. Meadows Field Airport, in Bakersfield, is approximately 22 miles northeast of the South Star Project area.

Two smaller local airports are within 10 miles of the project transmission line. These include the Taft-Kern County Airport, approximately 2 miles south of the transmission line, and the Elk Hills Buttonwillow Airport, more than 11 miles north of the transmission line.

In accordance with Title 14 Part 77 of the Code of Federal Regulations (CFR), a Notice of Construction or Alteration must be filed with the Federal Aviation Administration (FAA) if there is any structure rising 200 feet (500 feet in uncongested areas) above the average ground level in the vicinity of the construction site. A notice is also required if any structure protrudes above an imaginary surface extending from the end of the nearest runway at a slope of 50:1 for 10,000 feet, if the longest runway length at the airport is 3,200 feet or less; or a slope of 100:1 for 20,000 feet, if the longest runway at the airport is longer than 3,200 feet.

Since the closest runway is more than 2 miles away, approximately 90-foot high transmission structures will not penetrate the aviation "regulatory surface" at the closest airport. Therefore, a FAA Notice of Construction is not required for the transmission line.

6.2.3 Audible Noise and Radio/TV Interference

Audible noise is defined as any unwanted sound from a man-made source such as a transmission line, a transformer, an airport, vehicular traffic, etc. Audible noise is superimposed on the background or ambient noise that existed prior to the introduction of the audible noise source.

When an electric transmission line is energized, an electric field is generated in the air around the conductors. This electric field may cause corona. Corona is the breakdown of the air in the vicinity of the transmission line phase conductors. When the intensity of the electric field at the conductor surface exceeds the breakdown strength of the surrounding air, a corona discharge occurs at the conductor surface. This corona discharge produces energy, which can result in audible noise and/or radio interference (RI) and television interference (TVI).

The audible noise calculation results for the proposed line are shown in Figure 6-4 and Figure 6-5.

Corona on transmission line conductors can also generate electromagnetic noise in the frequency bands used for radio and television signals. This phenomenon is generally referred to as RI and TVI. These terms are commonly applied to any disturbance within the radio frequency band. RI and TVI consists of two distinct types: gap-type noise and noise due to corona. Gap-type noise is the result of sparking or arcing between two pieces of hardware. This arcing occurs when hardware is loose (not tight fitting) or at sharp burrs or edges on the hardware. This type of noise occurs at discrete points along the line and is often associated with undermaintained lines. Such interference can be easily identified and corrected with proper maintenance. The second type of noise is caused by corona on the conductors. This corona noise emanates from the entire length of conductor and is typically referred to as RI and TVI.

Corona related interference with radio and television reception is typically associated with transmission line voltages of 345 kV or greater, although it may occur at lower voltages. It is a direct function of the signal strength of the received radio/TV signal and the level of the noise present. The signal to noise ratio (S/N) is defined as the ratio of the average signal power to the average noise power. The higher the S/N ratio, the better the reception quality. A high S/N ratio indicates a high signal level and a low noise level. Consider the analogy of a person talking in a room with low background noise and a person talking in a room with high background noise. If the person’s voice (signal level) remains constant, the person will be heard much more easily in a room with low background noise than the person in a room with high background noise. This concept also applies to radio and television signals in the presence of background noise.

It is difficult to determine whether a particular level of RI or TVI will cause unacceptable radio or TV reception. Studies have, however, been conducted to determine acceptable signal to noise ratios. For radio reception, a S/N ratio above 20 is generally considered to provide acceptable reception. For TV reception, a S/N ratio of 30 to 40 typically provides acceptable reception. It is anticipated that for receivers proximate to the proposed line right-of-way, there will be little, if any, degradation of radio or TV reception. The exception, if any, will be for very remote, poorly received stations. In addition, RI typically interferes with Amplitude Modulated (AM) stations only. Frequency Modulated (FM) stations are generally immune to RI due to the inherent characteristics of the modulation scheme. As such, the probability for RI complaints is reduced as a major band of the radio broadcast spectrum is generally unaffected by the phenomenon. The calculated RI and TVI for the proposed transmission line are shown in Figures 6-6, 6-7, 6-8 and 6-9. At the edge of the right-of-way and for the double circuit line, the RI will be approximately 19 decibels measured at micro volts per meter (DBμV/M) and approximately 35 DBμV/M under fair and rainy weather conditions, respectively. These levels of interference would not be expected to be noticeable except for remote stations. The TVI at the edge of the right of way and for the double circuit line will be approximately 1 DBμV/M, which will only be noticeable for weak (remote) stations.

The proposed line will be maintained as part of a regular maintenance program. Therefore, it is unlikely any gap-type noise will result. If gap-type noise is reported or discovered, it will be quickly mitigated. In addition, it is anticipated that few if any RI/TVI complaints will occur due to the low magnitude of calculated corona noise. If complaints do occur, they will be addressed, investigated, and mitigated if needed, on a case-by-case basis.

6.2.4 Electric and Magnetic Fields

Electricity is a phenomenon resulting from the existence and interaction of charges. When a charge is stationary or static, it produces forces on objects in regions where it is present. When a charge is in motion, it produces magnetic effects. Whenever electricity is used or transmitted, electric and magnetic fields are created. Transmission lines, distribution lines, house wiring, and appliances produce electric fields in their vicinity, due to the electric charges associated with the appliances/conductors. Electric field strengths are typically expressed in units of volts per meter (V/m) or kilovolts (thousands of volts) per meter (kV/m).

Electric charges in motion (currents) produce magnetic fields. The strength of a magnetic field is proportional to the current through the conductor (circuit) producing the field. Magnetic fields can be characterized by the force they exert on a moving charge or on an electric current. Electric currents are sources of magnetic fields. Magnetic field strengths are measured in milligauss (mG).

An example of electric and magnetic fields in a home is a lamp plugged into an electrical outlet. If the lamp is not on (turned off), an electric field exists in the vicinity of the cord of the lamp due to the voltage on the cord. When the lamp is turned on, current flows through the cord and a magnetic field also exists around the cord due to the current flow.

The strength of an electric field depends on the potential (voltage) of the source of the field and distance from that source to the point of measurement of the field strength. Electric fields decrease rapidly as the distance (r) from the source increases. If an energized conductor (source) is placed inside a grounded conducting enclosure, the electric field outside the enclosure will approach zero (limited by ambient electric field level) and the source is said to be shielded.

Transmission line related magnetic fields decrease at a rate of $1/r^2$ if currents are balanced and conductors are closely spaced. Magnetic fields associated with unbalanced phase currents decrease at a rate inversely proportional to the distance from the source (conductor), at a rate of 1/r.

The electric field created by a high voltage transmission line extends from the energized conductors to other nearby conducting objects such as the ground, structures, vegetation, buildings, vehicles, and people. The strength of the vertical component of the electric field at a height of 1 meter (3.28 feet) is frequently used to characterize electric fields under transmission lines.

The transmission line parameters that have the greatest effect on electric and magnetic field levels in the vicinity of a transmission line are maximum operating voltage, line current, conductor height, and electrical phasing. The maximum ground level electric and magnetic fields typically occur near the centerline of a line and at midspan where the conductors are closest to the ground.

The electric and magnetic fields from the proposed transmission line were calculated using the BPA Corona and Field Effects (CFE) Program. The strengths of the electric and magnetic fields were calculated for a sensor height of 1 meter above ground. Calculations were performed based on the minimum ground clearance (midspan) and extend to 150 feet on each side of the centerline. The CFE Program is a two dimensional program which assumes infinitely long straight conductors at a given conductor height above ground. The calculated magnetic field associated with the CFE Program is the semi-major axis component of the magnetic field.

The calculated magnetic fields produced by the proposed line are shown in Figures 6-10 and 6-11.

Note that for maximum current flow, the magnetic fields at the edge of the right-of-way will be approximately 35 mG. At 150 feet from the center of the right of way, the magnetic field level decreases to less than 6 mG. For lower currents through the transmission line conductors, the magnetic field levels will decrease in direct proportion to the reduction in current.

The proposed route of the South Star transmission line is located in a sparsely populated area of Kern County. The closest house to the proposed route is at least 1 mile away. At this distance, the contribution of the magnetic field of the transmission line to the overall magnetic field level will not be measurable.

Over the past 20 years, considerable research has been conducted on the effects of electric and magnetic fields on human health. Some epidemiological studies have shown an association between the occurrence of leukemia in children and the proximity of their homes to large transmission and distribution power lines. These same studies have not shown an association between measured magnetic field levels from the power lines and the occurrence of leukemia. This paradox has not been explained even though many research studies have been conducted to explore possible reasons for its existence.

Many laboratory studies have been conducted to explore biological interactions with electric and magnetic fields. Despite the hundreds of studies conducted around the world and many years of effort, no biological mechanism has been demonstrated that can link electric and magnetic field exposure to occurrences of human diseases such as cancer. The current body of scientific evidence suggests that magnetic fields from sources such as power lines are a possible but not a proven cause of significant health effects in humans.

The electric field levels produced by the proposed transmission line are shown in Figures 6-12 and 6-13.

Note that at the edge of the right-of-way, the electric field level is approximately 0.4 kV/m. As with magnetic fields, many research studies have been conducted to assess the relationship between human health effects and exposure to electric fields. The current body of scientific literature suggests that there are no adverse health consequences from exposure to electric fields of this magnitude produced by the proposed line.

Given the current concerns about human exposure to electric and magnetic fields and possible adverse health affects, several states have adopted standards limiting electric and magnetic field levels within or at the edge of transmission line rights-of-way (reference Table 6-5). California does not, however, have regulatory requirements for levels of electric and magnetic fields.

While California does not have regulatory requirements for transmission line magnetic fields, the calculated magnetic fields for the proposed transmission line are much lower than the requirements for those states with existing limitations.

California does not have a regulatory level for transmission line electric fields. However, calculated values for the proposed line are also substantially below the levels established by those states that do have limits.

6.2.4.1 Transmission Line EMF Reduction

While the State of California does not require any particular limit for electric and magnetic field levels, the CPUC mandates EMF reduction as a practicable design criterion for new and upgraded electrical facilities. From this mandate, the regulated electric utilities, including PG&E, have developed their own design guidelines to reduce EMF at each new facility. The California Energy Commission (CEC) requires independent power producers to follow the guidelines that have already been established by the local electric utility or transmission-system owner.

In keeping with the goal of EMF reduction, the South Star Cogeneration Project will be generally designed and constructed using the principles outlined in the PG&E publication, "Transmission Line EMF Guidelines." These guidelines explicitly incorporate the directives of the CPUC by developing design procedures compliant with Decision 93-11-013 and GO-95, 128, and 131-D. That is, when the towers, conductors, and rights-of-way are designed and routed according to the PG&E guidelines, the transmission line is consistent with the CPUC mandate.

From the PG&E Guidelines, the primary techniques for reducing EMF anywhere along the line are to:

- Increase the distance from the line conductors;
- Reduce the spacing between the line conductors;
- Optimize the configuration of the phases (A, B, C).

To increase the distance from the line conductors, new line construction will be routed either adjacent to vacant land or along existing utility corridors, thereby avoiding close proximity to residential and public-use areas. Along the route of the overhead line, the land adjacent is a mix of oil and gas production, industrial, and vacant land. The nearest residence is 1 mile away. The right-of-way will generally be 75 feet wide, with the line routed along the centerline.

While the EMF levels have been calculated for the South Star Cogeneration Project transmission line as designed, the CEC requires actual measurement of EMF for comparison of "before" (background) EMF with "after" (transmission line and background together) EMF levels. These verification measurements will be made consistent with IEEE guidelines and will provide sampled readings of edge of right-of-way EMF. Additional measurements will be made upon request for areas of particular concern.

6.2.4.2 Conclusion on EMF

Electromagnetic field reduction will be an integral consideration during the design and routing of the interconnection between the South Star Project and Morgan Substation. As noted in Section 6.2.1.1, the phasing arrangement used will be the low reactance (cross) phasing to reduce electric and magnetic field levels. Since the PG&E Transmission Line EMF Guidelines embody the CPUC directives for EMF reduction, the guidelines are the primary criteria for EMF considerations in this project.

The route of the proposed transmission line is not near any areas of public concern, including schools and day care centers. Mitigative measures, such as locating the line away from sensitive facilities or increasing the height above ground of the conductor when a sensitive facility is close to the edge of the right-of-way, will not be required.

6.2.5 Induced Current and Voltages

A conducting object, such as a vehicle or person, in an electric field will experience induced voltages and currents. The magnitude of the induced current will depend upon the electric field strength, the size and shape of the object, and object-to-ground resistance. The measured induced current for a person in a 1 kV/m electric field is 0.016 milliamps (mA); for a large school bus, 0.41 mA; and for a large trailer truck, 0.63 mA.

When a conducting object in an electric field is isolated from ground, and a grounded person touches the object, a perceptible current or shock may occur. The magnitude of the current depends upon the field strength, the size (or length for fences, pipelines, and railroad tracks) of the object and the grounding resistance of the object and person. Shocks are classified as below perception, above perception, secondary, and primary. The mean perception level is 1.0 mA for a 180-pound man and 0.7 mA for a 120-pound woman. Secondary shocks cause no direct physiological harm but may annoy a person and cause involuntary muscle contraction. The lower average secondary-shock level for an average-sized man is about 2 mA. Primary shocks can be harmful; their lower level is described as the current at which 99.5% of subjects can still voluntarily “let go” of the shocking electrode. For the 180-pound man this is 9 mA, for the 120-pound woman, 6 mA, and for children, 5 mA.

The National Electric Safety Code (NESC) specifies 5 mA as the maximum allowable short-circuit current to ground from vehicles, trucks, and equipment near transmission lines.

The mitigation for hazardous and nuisance shocks is to ensure that metallic objects on or near the right-of-way are grounded, and that sufficient clearances are provided at roadways and parking lots to keep electric field induced voltages at these locations sufficiently low to prevent vehicle short-circuit currents resulting from vehicle contact by persons below 5 mA.

Magnetic fields can also induce voltages and currents in conducting objects. Typically, this requires a long metallic object such as a fence, pipeline, or railroad that is grounded at only one location. A person who touches the object, at a location remote from the grounded point, will experience a shock similar to that described above for an ungrounded object. This problem can be mitigated by installing multiple grounds on fences or pipelines parallel to the transmission line.

The proposed 115 kV transmission line will be constructed in conformance with GO-95 and Title 8 CCR 2700 requirements. Therefore, hazardous shocks are unlikely to occur as a result of the South Star Project construction or operation.

6.2.5.1 Nuisance Shocks

Normal grounding practices effectively mitigate the possibility of nuisance shocks due to induced currents from stationary objects near the line such as fences and buildings. Since the electric field extends beyond the right of way, grounding requirements extend beyond the right of way for very large metal objects or very long fences. Electric fences require a special grounding technique because they can only operate if they are insulated. Application of the grounding policy during and after construction will effectively mitigate the potential for shocks from stationary objects near the proposed line.

6.2.6 Fire Hazards

The transmission line will be constructed in conformance with CPUC GO-95 and NESC standards. Title 14 CCR Section 1250 Article 4, from CPUC GO-95, establishes fire prevention standards for electric utilities. The South Star Project will comply with these fire prevention standards.

6.2.7 Applicable LORS

The applicable LORS, which apply to the line safety and nuisance criteria, are listed below. These LORS apply to the preferred project description and any project alternates.

6.2.7.1 Aviation Safety

Table 6-6 lists the applicable aviation safety LORS.

6.2.7.2 Fire Hazard

Table 6-7 lists the applicable fire hazard LORS.

6.2.7.3 Communication Interference

Table 6-8 lists the applicable LORS regarding communications interference.

6.2.8 Systems Feasibility Study Conclusion

Refer to the Preliminary Transmission System Feasibility Study contained in this application for the complete study.

The conclusions for 112 MW (Phase I of South Star I and II) and 224 MW (South Star I and II) generation at South Star are as follows. Please note that the values for EMF, RI, TVI and audible noise were calculated using 260 MW (net — approximate maximum at minimum ambient temperature).

6.2.8.1 Impacts and Mitigation's Due to Phase I 112 MW Generation at South Star I and II

- A third transformer at Midway is being planned.
- Add a parallel transformer between Taft 115 kV – Taft A70 kV. If this addition is not made, generation would be limited to 65 MW during Summer conditions, when Fellows – Santa Fe 115 kV (Morgan Substation) is out of service.
- During winter, generation at the Santa Fe Substation (Morgan Substation) could be limited to 35 MW due to limitation on 115 kV Alpaugh - Smyrna. To increase the generation above 75 MW the Quebec-Alpaugh line would also require upgrading.

- During heavy Spring, generation at Santa Fe Substation (Morgan Substation) would be limited to about 109 MW when the Taft – Santa Fe 115 kV is out of service, due to overloading on the Fellows – Taft Junction 115 kV line.
- The following 230/115 /70 kV lines are required to be upgraded for transferring up to 112MW from South Star. The upgrading of these lines is required for transferring more than 35 MW during winter only.

115 kV Lines:

From - To Buses	Length (Miles)	Estimated Conductor Sizes Present	New
Alpaugh – Smyrna	3	477	795
Quebec - Alpaugh	3	477	795

6.2.8.2 Impacts and Mitigation's Due to 224 MW Generation at South Star I and II

- During winter, to increase generation at South Star above 167 MW the 115 kV Quebec – Corcoran line requires upgrading.
- The following 230/115 /70 kV lines are required to be upgraded for transferring 224MW from South Star:

115 kV Lines:

From - To Buses	Length (Miles)	Estimated Conductor Sizes Present	New
Midway - Cymric	11	477	795
Midway - Navy 35R	8	477	636
Taft - Santa Fe	7	336	795
Taft - Navy 35R	9	477	636
Fellows - Taft Jct.	4	336	795
Fellows - Santa Fe	1	336	795
Cymric - Taft Jct.	6	477	636
Quebec - Corcoran	3	477	795

70 kV Lines:

From - To Buses	Length (Miles)	Estimated Conductor Sizes Present	New
Blackwell - Carneras	6	2/0	4/0
Carneras - UCPL	6	2/0	4/0
McKittrick - Temblor	8	4/0	266.8
Temblor - UCPL	7	2/0	4/0

6.2.8.3 Agency Contacts

Local contacts for the South Star to Morgan Substation transmission line and the Morgan Substation are:

Agency	Contact/Title	Telephone Number
California Department of Water Resources	Dan Herdocia/ Chief, Power Contracts Branch	(916) 653-9677
California ISO	Armando Perez/ Director, Grid Planning	(916) 351-4400
Pacific Gas & Electric	Thomas Vantz Contract Administrator	(415) 973-1997

Table 6-1. Design and Construction LORS

LORS	Applicability	AFC Reference
GO-95 CPUC, "Rules for Overhead Electric Line Construction."	CPUC rule covers required clearances, grounding techniques, maintenance, and inspection requirements.	Section 6.1.2
Title 8 California Code of Regulations (CCR), Section 2700 et seq. "High Voltage Electrical Safety Orders."	Establishes essential requirements and minimum standards for installation, operation and maintenance of electrical installation and equipment to provide practical safety and freedom from danger.	Section 6.1.2
GO-128 CPUC, "Rules for Construction of Underground Electric Supply and Communications Systems."	Establishes requirements and minimum standards to be used for the station AC power and communications circuits.	Section 6.1.2
GO-52 CPUC, "Construction and Operation of Power and Communications Line."	Applies to the design of facilities to prevent or mitigate inductive interference.	Section 6.1.2
ANSI/IEEE 693 "IEEE Recommended Practices for Seismic Design of Substations."	Provides recommended seismic design and construction practices.	Section 6.1.2
IEEE 1119 "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations."	Provides recommended clearance practices to protect persons outside, the facility from electric shock.	Section 6.1.2
ANSI/IEEE 605 "IEEE Guide for Design of Substation Rigid Bus Structures."	Provides recommended design and construction practices for substation rigid bus systems.	Section 6.1.2
NFPA 70-1996 "National Electrical Code."	Establishes requirements and minimum standards for low voltage AC systems	Section 6.1.2

Table 6-2. Fire Hazard LORS

LORS	Applicability	AFC Reference
Title 14 CCR Sections 1250-1258, "Fire Prevention Standards for Electric Utilities."	Provides specific exemptions from electric pole and tower firebreak and electric conductor clearance standards, and specifies when and where standards apply.	Section 6.1.2
ANSI/IEEE 979 "IEEE Guide for Substation Fire Protection."	Provides guidance for fire protection practices that should be used in designing control and relay buildings.	Section 6.1.2
GO-95 CPUC, "Rules for Overhead Electric Line Construction" Section 35.	CPUC rule covers tree trimming criteria to mitigate fire hazard.	Section 6.1.2

Table 6-3. Hazardous Shock LORS

LORS	Applicability	AFC Reference
Title 8 CCR Section 2700 et seq. "High Voltage Electrical Safety Orders."	Establishes essential requirements and minimum standards for installation, operation and maintenance of electrical equipment to provide practical safety and freedom from danger.	Section 6.1.2
ANSI/IEEE 80 "IEEE Guide for Safety in AC Substation Grounding."	Presents guidelines for assuring safety through proper grounding in AC outdoor substations.	Section 6.1.2
National Electrical Safety Code (NESC), ANSI C2, Section 9. Article 92, Paragraph E; Article 93, Paragraph C.	Covers grounding methods for electrical supply and communications facilities.	Section 6.1.2

Table 6-4. Jurisdiction

Agency or Jurisdiction	Responsibility
CPUC Mr. Julian Ajello Supervisor, North California Safety Section 505 Van Ness Avenue San Francisco, CA 94102 (415) 703-1327	Regulates construction and operation of overhead transmission lines. (General Order No. 95); Regulates construction and operation of underground transmission and distribution lines. (General Order No. 128); Regulates construction and operation of power and communications lines for the prevention of inductive interference. (General Order No. 52)
Federal Aviation Administration (FAA) Ms. Karen McDonald Airspace Planner P.O. Box 92007 Los Angeles, CA 90009 (310) 725-6557	Establishes regulations for marking and lighting of obstructions in navigable airspace. (AC No. 70 7460-1G)
Kern County Electrical Inspector Mr. Manual Wright Engineering and Surveying Services Kern County 2700 Michael Street Bakersfield, CA 93301 (805) 862-8661	Jurisdiction over safety inspection of electrical installations that connect to the supply of electricity. (NFPA 70)
Western Systems Coordinating Council (WSCC) Mr. Dennis E. Eyre Executive Director 540 Arapeen Drive, Suite 203 Salt Lake City, UT 84108 (801) 582-0353	Establishes power supply design criteria to improve reliability of the power system.

Table 6-5. State Regulatory Requirements on Electric and Magnetic Fields

	Electric Field		Magnetic Row
	On ROW	**Edge of ROW**	**Edge of ROW**
Florida	8 kV / m[1] 10 kV / m[2] —	2 kV / m — —	150 mG[1] (max load) 200 mG[2] (max load) 250 mG[3] (max load)
Minnesota	8 kV / m	—	—
Montana	7 kV / m[4]	1 kV / m	
New Jersey	—	3 kV / m	—
New York	11.8 kV / m 11.0 kV / m[5] 7 kV / m[4]	1.6 kV / m — —	200 mG (max load)
North Dakota	9 kV / m[6]	—	—
Oregon	9 kV / m[7]	—	—
Rhode Island	8 kV / m[8]	—	—

1 For lines of 69 kV-230 kV.
2 For 500 kV lines.
3 For double circuit 500 kV lines.
4 Maximum for highway crossings.
5 Maximum for private road crossings.
6 For 115 kV lines and above.
7 For 230 kV lines and above.
8 For all new lines.

Table 6-6. Aviation Safety LORS

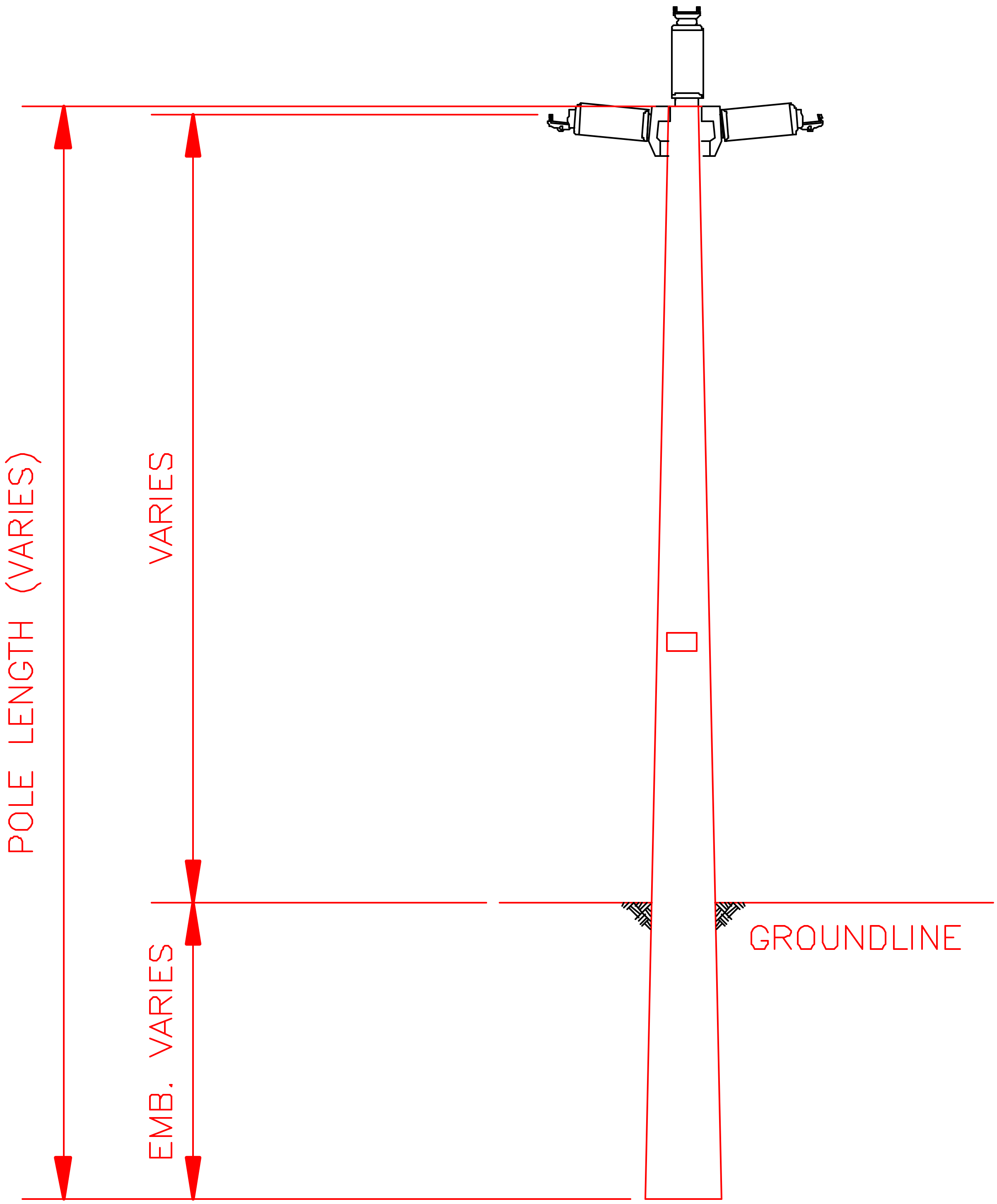
LORS	Applicability	AFC Reference
Title 14 CFR Part 77 "Objects Affecting Navigable Airspace."	Describes the criteria used to determine whether a "Notice of Proposed Construction or Alteration" (NPCA, FAA Form 7460-1) is required for potential obstruction hazards.	Section 6.2.2
FAA Advisory Circular No. 70/7460-1G, "Obstruction Marking and Lighting."	Describes the FAA standards for marking and lighting of obstructions as identified by Federal Aviation Regulations (FAR) Part 77.	Section 6.2.2
FAA Advisory Circular No. 70/7460-2H, "Proposed Construction or Alteration of Objects that may Affect the Navigable Airspace."	Informs individuals proposing to erect or alter an object, which may affect the navigable airspace regarding the need to notify the FAA prior to such construction.	Section 6.2.2
Public Utilities Code (PUC), Sections 21656-21660.	Discusses the permit requirement for construction of possible obstructions in the vicinity of aircraft landing areas, to navigable airspace, and near the boundary of airports.	Section 6.2.2

Table 6-7. Fire Hazard LORS

LORS	Applicability	AFC Reference
Title 14 CCR Section 1250-1258, "Fire Prevention Standards for Electric Utilities."	Provides specific exemptions from electric pole and tower firebreak and electric conductor clearance standards, and specifies when and where standards apply.	Section 6.2.6
GO-95 CPUC, "Rules for Overhead Electric Line Construction" Section 35.	CPUC rule covers tree trimming criteria to mitigate fire hazard.	Section 6.2.6

Table 6-8. Communication Interference LORS

LORS	Applicability	AFC Reference
Title 47 CFR Section 15.25, "Operating Requirements, Incidental Radiation."	Prohibits operations of any device emitting incidental radiation that causes interference to communications. The regulation also requires mitigation for any device, which causes interference.	Section 6.2.3
General Order 52 (GO-52), CPUC.	Governs the "Construction and Operation of Power and Communications Lines" and specifically applies to the prevention or mitigation of inductive interference.	Section 6.2.3 Section 6.2.4
CEC staff, Radio Interference and Television Interference (RI-TVI) Criteria (Kern River Cogeneration Project 82-AFC-2, Final Decision, Compliance Plan 13-7).	Prescribes the CEC's RI-TVI mitigation requirements, developed and adopted by the CEC in past citing cases.	Section 6.2.3

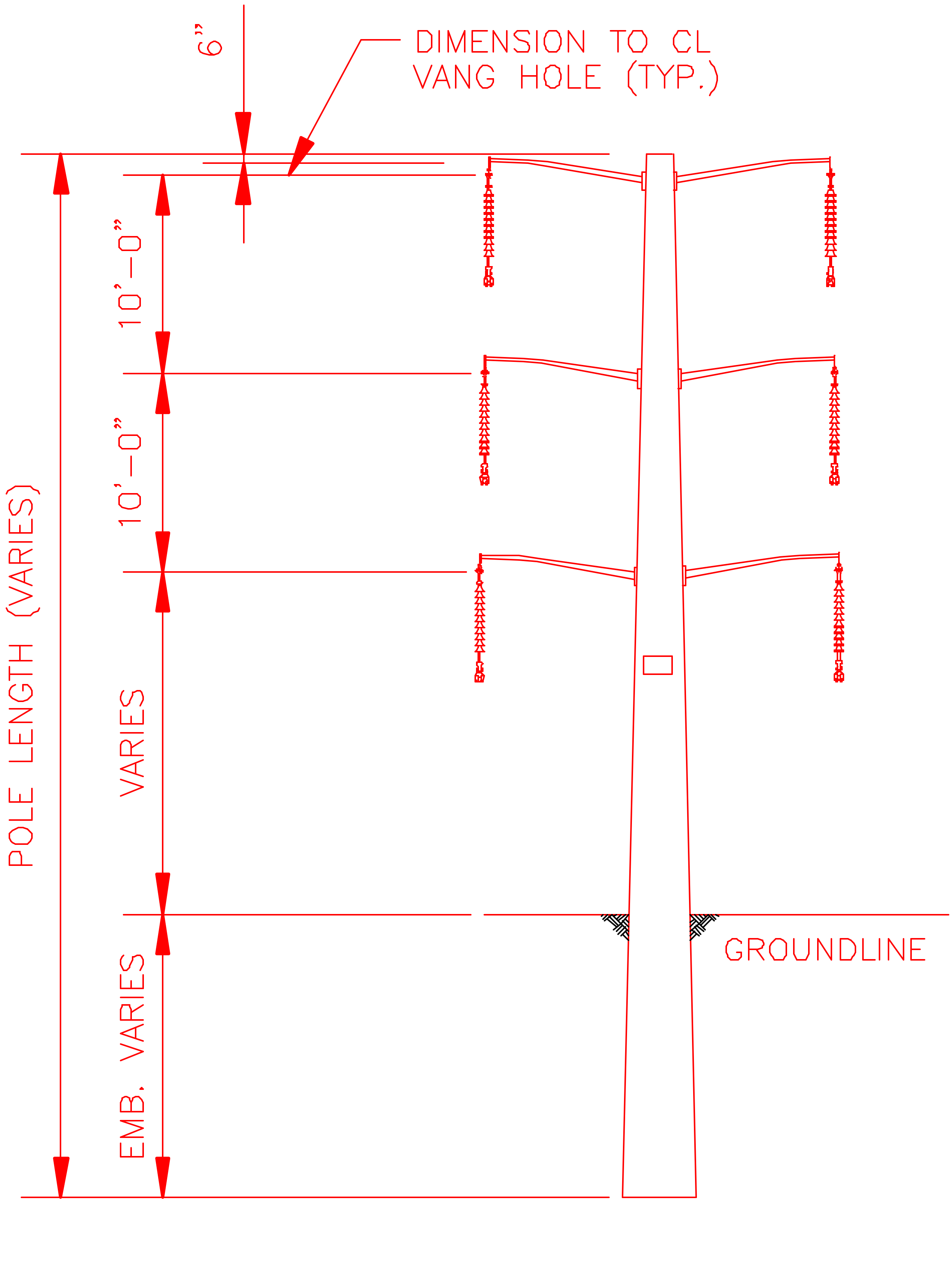


South Star
Cogeneration Project

Project No. 51-00167034.00

Proposed Single Circuit Tangent Configuration

Figure 6-1



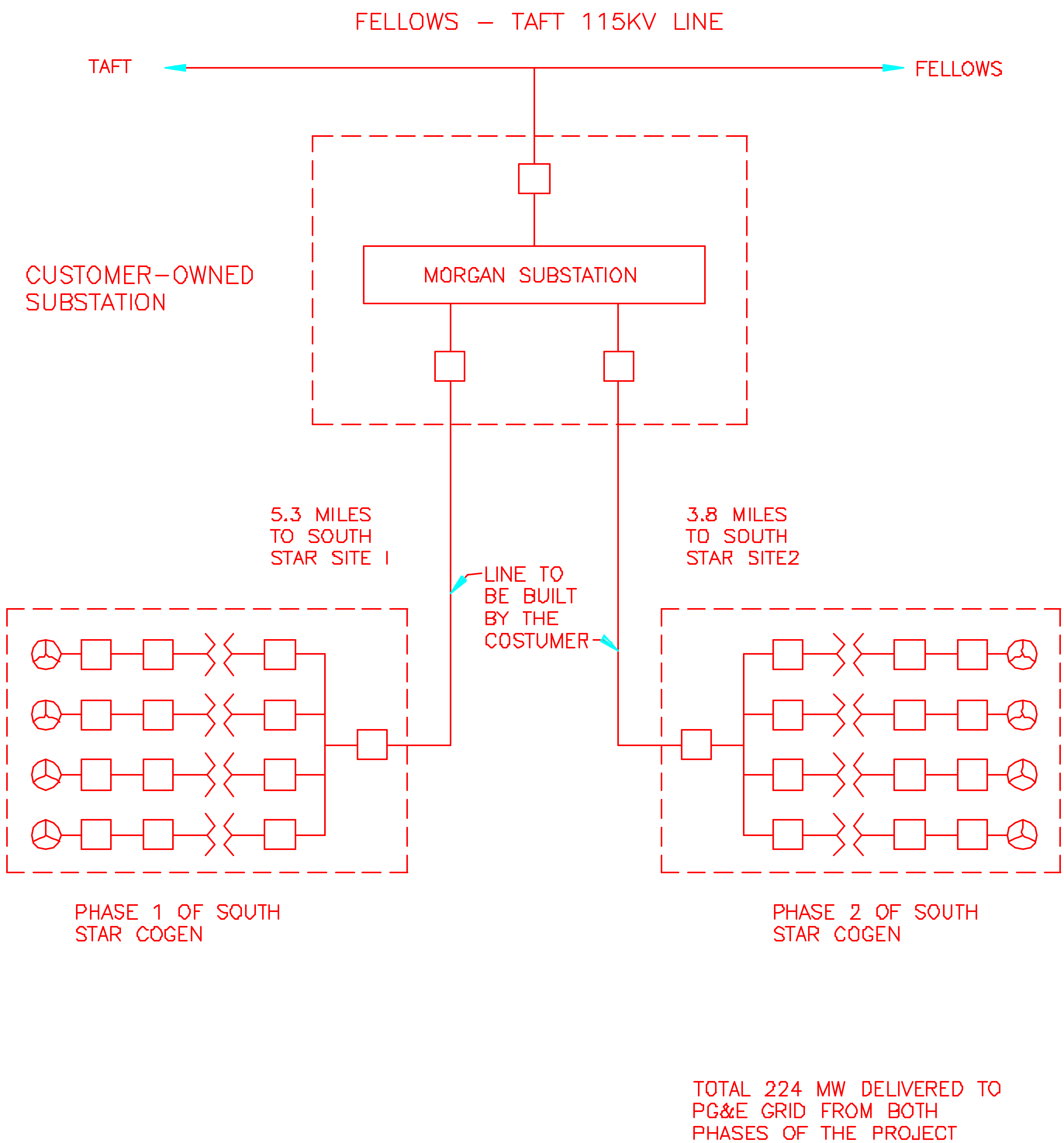
URS

South Star
Cogeneration Project

Project No. 51-00167034.00

Proposed Double Circuit Tangent Configuration

Figure 6-2



URS	South Star Cogeneration Project Project No. 51-00167034.00	Project One-Line Diagram	Figure 6-3

Figure 6-4
Double Circuit Configuration

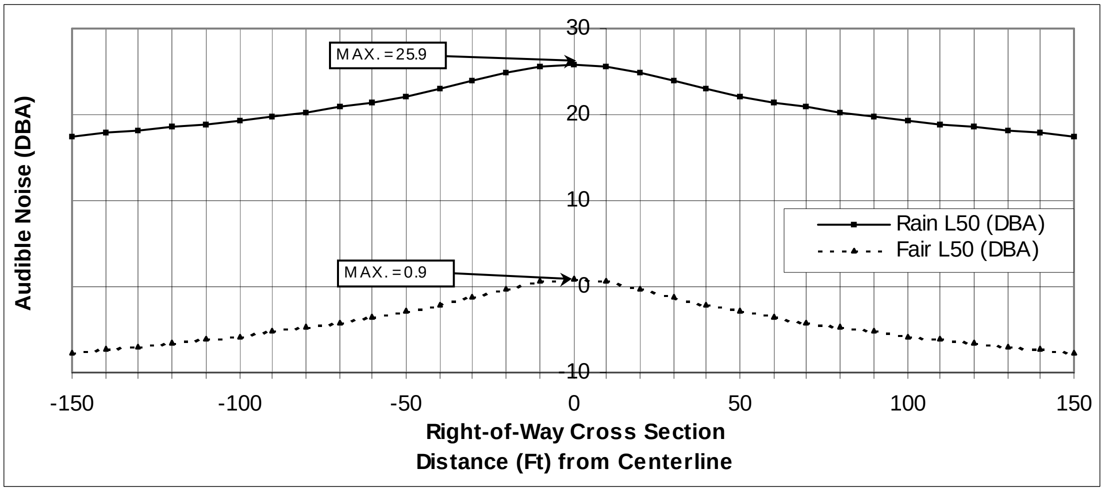


Figure 6-5
Single Circuit Configuration

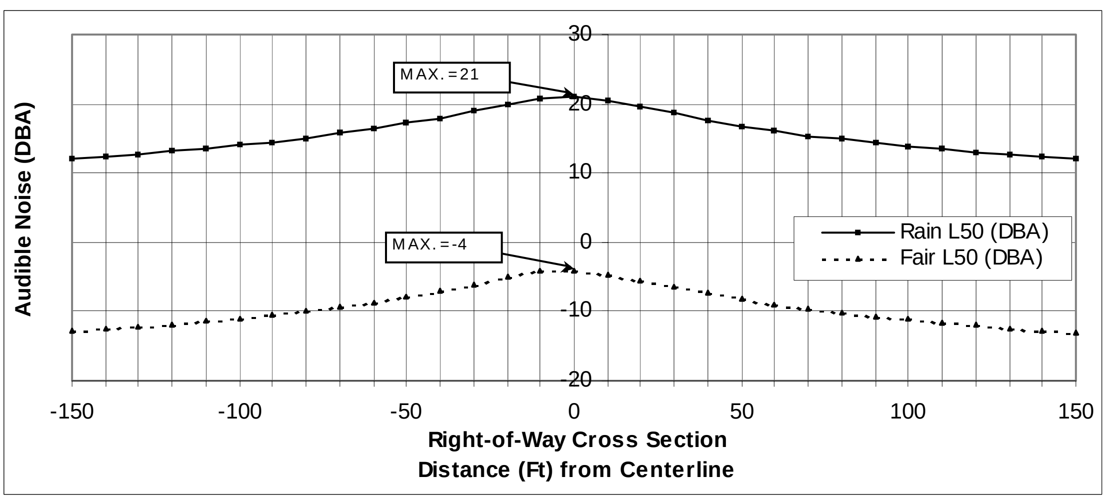


Figure 6-6
Double Circuit Configuration

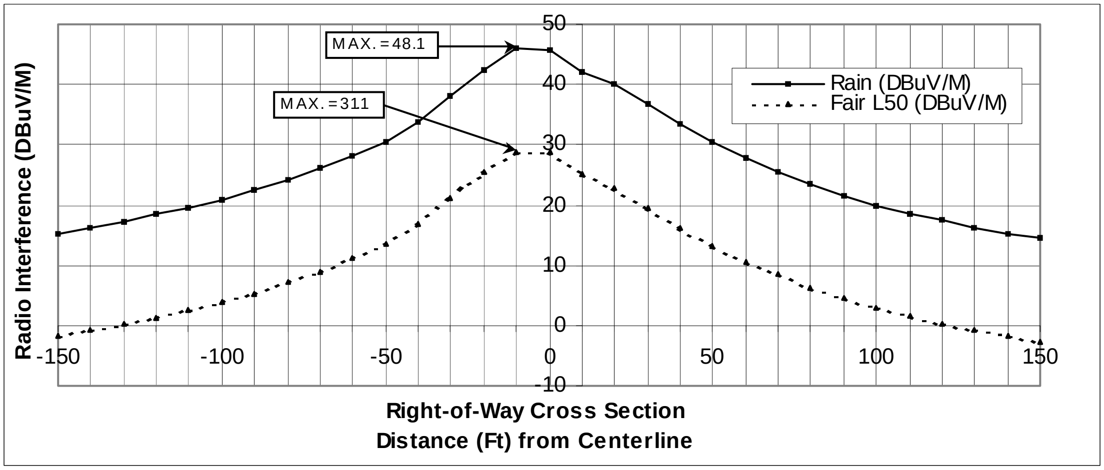


Figure 6-7
Single Circuit Configuration

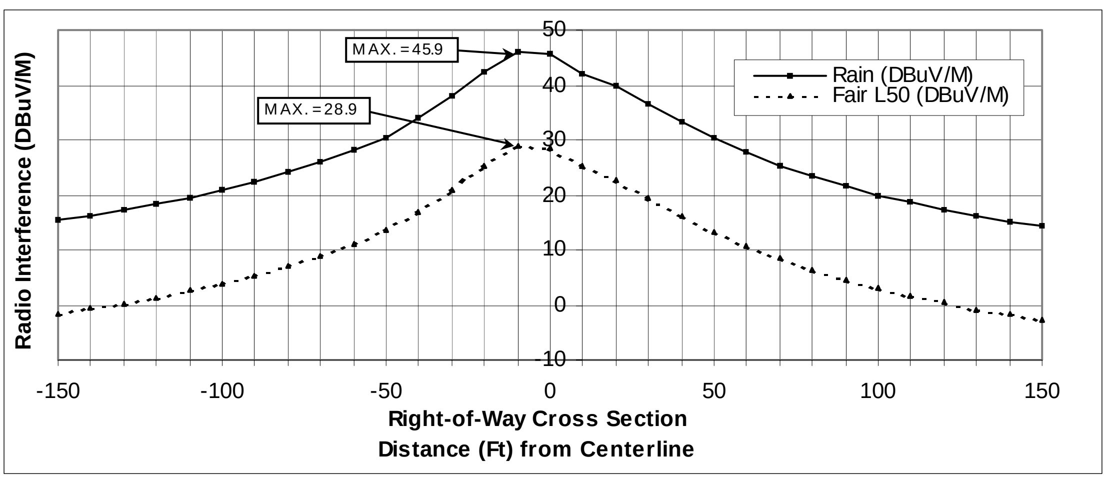


Figure 6-8
Double Circuit Configuration

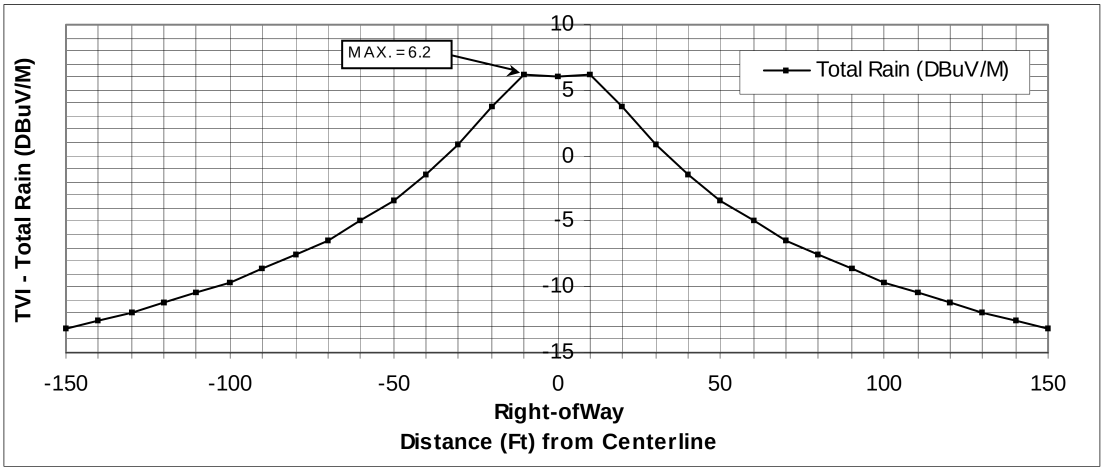


Figure 6-9
Single Circuit Configuration

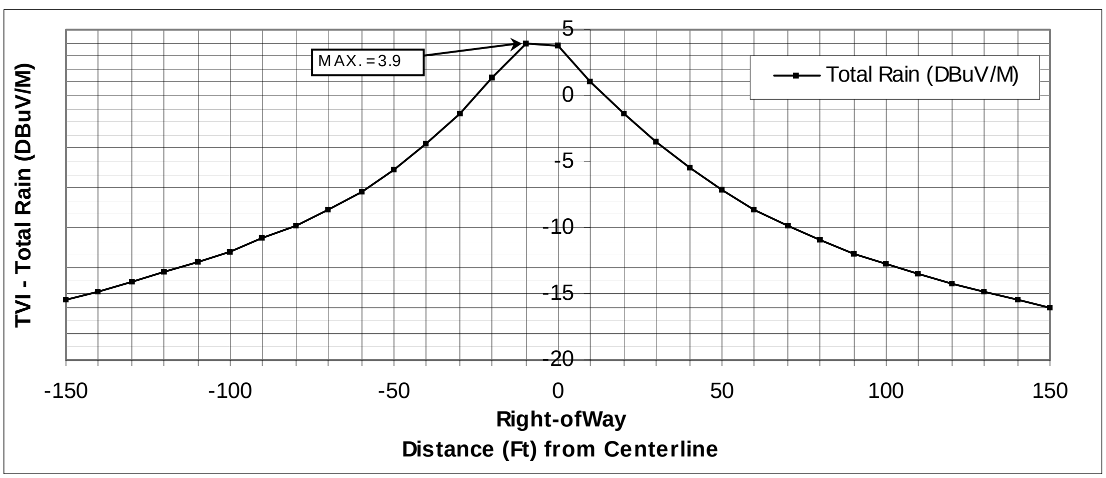


Figure 6-10
Double Circuit Configuration

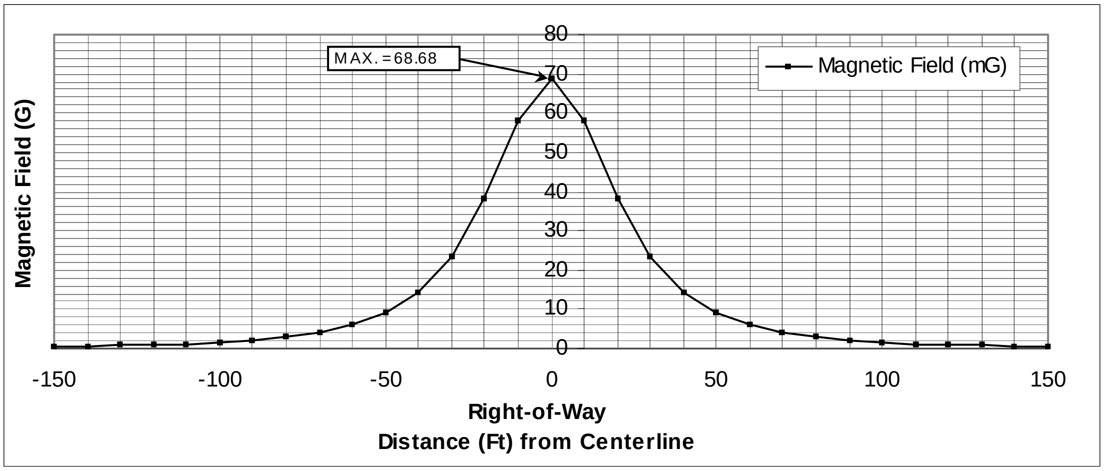


Figure 6-11
Single Circuit Configuration

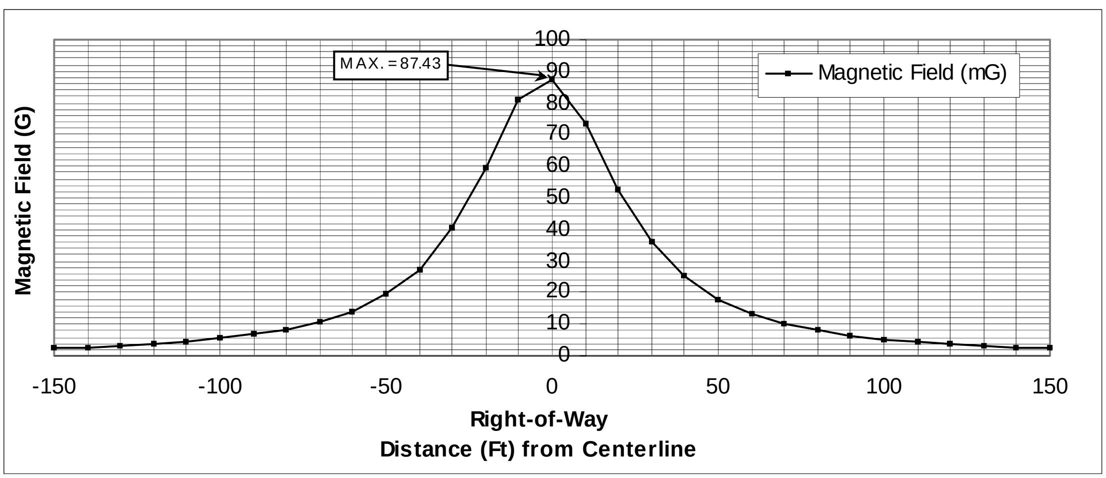


Figure 6-12
Double Circuit Configuration

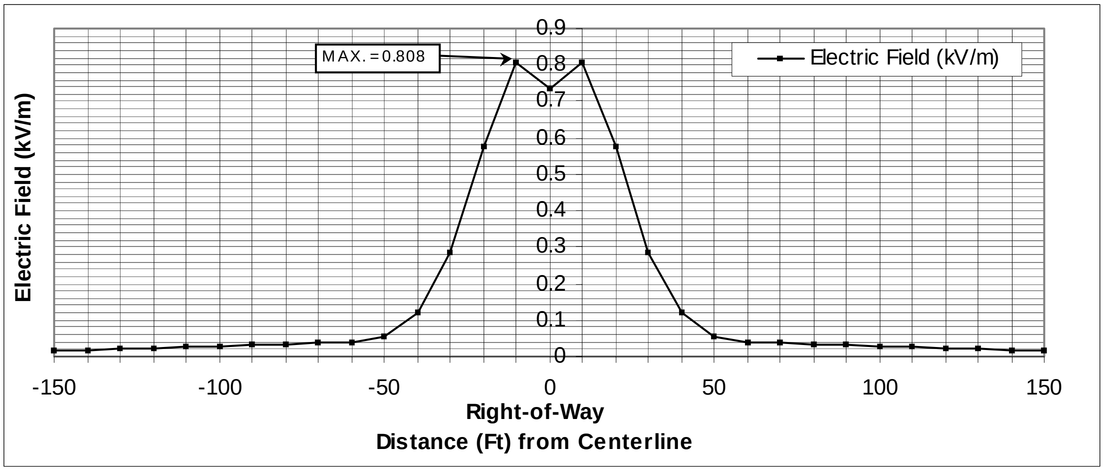


Figure 6-13
Single Circuit Configuration